Upper Pliocene Fossils from Cape Runaway.

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Recently, as the result of road construction near Cape Runaway, a small but richly fossiliferous bed was exposed for the first time.

The writer is indebted to Mr. and Mrs. A. E. Kemp, of Cape Runaway, for notification of this important discovery, and also for hospitality extended to him last August during a visit of three days, when the collection here described was made.

The main exposure is in one bank of a road cutting, just below Te Piki, upon the Whangaparaoa–Te Araroa main road (Plate 57). In extent it is not more than sixty feet in total length, and the portion exposed above the bottom of the cutting not more than four to twelve feet deep.

About one hundred yards up the road, south of the main bed, there is a smaller exposure identical in character with the first one, except that fossils are fewer and less varied.

The matrix is a soft blue-clay and the fossils are strong and excellently preserved, many of them still retaining their original colour markings.

The fossiliferous blue-clay is overlaid first by a narrow band of pure white fine pumiceous silt, two to three feet in thickness, and above this by some seven or eight feet of Recent soil and humus.

The bed is an important one, as it is the first extensive Castlecliffian fauna to be found outside the Wanganui district. Further, although the Cape Runaway bed is of very different facies, there appears some evidence in support of direct correlation with Landguard Bluff, which is on the eastern bank of the Wanganui, near the mouth, and is separated by that river from the extensive Castlecliff series of beds, upon which the stage name is based.

The Castlecliff beds are mostly blue clays with minor intercalated zones of brown sands, but at Landguard Bluff the blue clay is absent and the fossiliferous layers are of either brownish or yellowish sands, obviously of shallow-water deposition.

The reasons for assuming the Cape Runaway and Landguard faunules to be of contemporary age and yet slightly higher than those of Castlecliff are as follows:—

(a) *Capulus uncinatus* and *Eunaticina cincta* are restricted Landguard fossils, which so far as is known occur nowhere else in the Wanganui district, yet both are present at Cape Runaway.

(b) Typical nodulous examples of the Recent *Alcithoe arabica* are known as fossils only from Landguard Bluff and from Cape Runaway. The respective facies for these localities are: sandy bottom in shallow water down to five or six fathoms for the former, and mud bottom probably between 20 and 30 fathoms for the latter. Cape Runaway and Castlecliff are fairly similar in facies, yet of the numerous examples of *Alcithoe* found at Castlecliff *arabica* is not present, the inference being that it is a later evolutionary product. Recent examples of *arabica* are found living from low water to about 30 fathoms, on a substratum of either sand or mud.

(c) A new subspecies of *Glaphyrina vulpicolor,* described herein from Cape Runaway, has characters intermediate in development between those of the Castlecliff *progenitor* and the Recent *vulpicolor.*

The Cape Runaway specimens of *Austrosipho (Verconella) dilatata* are of a growth form identical with Recent specimens from depths between 20 and 30 fathoms. In any case Recent *dilatata* is not known from less than 20 fathoms.

Although the facies of the Cape Runaway bed is suggestive of deposition at between 20 and 30 fathoms, there occurs a few somewhat worn characteristic littoral specimens, such as *Lepsiella scobina* and *Ischnochiton maorianus,* which indicate proximity to a rocky shore, from which they were no doubt derived.

The most abundant fossils in the Cape Runaway bed are the following: *Maoricolpus rosea, Atrina zelandica, Pecten tainui, Austrosipho (Verconella) edita, Alcithoe arabica, Struthiolaria vermis* and *Pupa alba.*

Fossils were so abundant in one small pocket of about three feet in diameter that it was difficult to remove one without damaging others, so tightly were they packed together.

Although the road passes through many deep cuttings, strangely enough there appears to be no other beds of similar age anywhere else in the Cape Runaway district. Several other sparsely fossiliferous cuttings were examined, one in a gorge near Waihau Bay, another nearer to Te Araroa, but all contain a Miocene fauna probably of Awamoan age, certainly, however, lower than Pliocene.

Unfortunately the richly fossiliferous Landguard Bluff beds are no longer well exposed for collecting, as the construction of tide deflectors in the Wanganui River has caused drift sand to accumulate and obscure the lower and best fossiliferous strata.

Eleven new species and a new subspecies are described herein, and the types of all of them are in the Auckland Museum.

Complete List of Fossils collected at the Te Piki (Cape Runaway) Bed.

PHYLUM COELENTERATA.

* *Flabellum rugulosum* Tenison-Woods 1880	C.

PHYLUM MOLLUSCA.

Class Pelecypoda.

* *Nucula nitidula* A. Adams 1856	L, C.
* *Neilo australis* (Quoy & Gaimard 1835)	C.
* *Barbatia novaezelandiae* Smith 1915	C.
* *Modiolaria impacta* (Herrmann 1782)	C.
* *Trichomusculus barbatus* (Reeve 1858)	
Pecten (Notovola) tainui (Finlay 1930)	L, C.
* *Chlamys zelandiae* (Gray 1843)	C.
* *Chlamys radiatus* (Hutton 1873)	C.
* *Chlamys imparicostatus* (Bavay 1905)†	
* *Limatula maoria* Finlay 1926	L, C.
Mantellum marwicki (Powell 1926)	C.
* *Ostrea sinuata* Lamarck 1819	L, C.
* *Atrina zelandica* Gray 1835	C.
* *Venericardia purpurata* (Deshayes 1854)	L, C.
* *Venericardia purpurata difficilis* (Deshayes 1854)	C.
* *Pleuromeris zelandica* (Deshayes 1854)	C.
* *Zemysia zelandica* (Gray 1835)	L, C.
* *Chironia suborbicularis* (Montagu 1804)	C.
* *Arthritica bifurca* (Webster 1908)	C.
* *Melliteryx parva* (Deshayes 1856)	C.
* *Rochefortula reniformis* (Suter 1908)	C.
* *Scintillona zelandica* (Odhner 1924)	
* *Maoritellina huttoni sterrha* (Suter 1913)	
* *Leptomya retiaria* Hutton 1885	C.
* *Mactra ovata* (Gray 1843)	
* *Zenatia acinaces* (Quoy & Gaimard 1835)	C.
* *Dosinia lambata* (Gould 1850)	C.
* *Dosinia (Kereia) greyi* Zittel 1864	C.
* *Paradione (Notocallista) multistriata* (Sowerby 1851)	C.
* *Dosinula zelandica* (Gray 1835)	C.
Tawera wanganuiensis Marwick 1927	C.
* *Chione (Austrovenus) stutchburyi* (Gray 1828)	L, C.
* *Paphirus largillierti* (Philippi 1849)	L, C.
* *Nemocardium (Pratulum) pulchellum* (Gray 1843)	C.
* *Notocorbula zelandica* (Quoy & Gaimard 1835)	C.
* *Hiatella australis* (Lamarck 1818)	C.
* *Cleidothaerus maorianus* Finlay 1926	C.

CLASS GASTEROPODA.

Tugali superba n.sp.	
* *Emarginula striatula* Quoy & Gaimard 1834	C.
* *Trochus (Coelotrochus) tiaratus* Quoy & Gaimard 1834	L, C.
* *Trochus (Thorista) viridis* (Gmelin 1791)	C.
* *Cantharidus purpuratus* (Martyn 1784)	
* *Micrelenchus rufozonus* (A. Adams 1853)	C.
* *Dolicrossea vesca* Finlay 1926	
* *Estea semiplicata* Powell 1927	
* *Nozeba emarginata* (Hutton 1885)	C.
* *Lyroscila chathamensis* (Suter 1908)	

†In the "Zoological Record," vol. 68, 1932 (Moll.), p. 95, reference is made to a paper by L. G. Hertlein, J. Paleont. Sharon Mass., 1931, pp. 367-369, in which *Pecten zeelandonus* is given as a new name for *P. imparicostatus* Bavay. Hertlein's name is not adopted here, as the writer has been unable to refer to this paper, and find the reasons given for this name change.

	Notosinister tepikiensis n. sp.	
*	*Lilax nucleogranosum* (Verco 1904)	C.
*	*Maoricolpus rosea* (Quoy & Gaimard 1834)	L, C.
*	*Zeacolpus fulminatus* (Hutton 1873)	C.
*	*Struthiolaria papulosa* (Martyn 1786)	C.
*	*Pelicaria vermis* (Martyn 1786)	C.
	Capulus uncinatus (Hutton 1873)	L.
*	*Maoricrypta costata* (Sowerby 1824)	C.
*	*Maoricrypta (Zeacrypta) monoxyla* (Lesson 1830)	C.
*	*Sigapatella novaezelandiae* (Lesson 1830)§	C.
*	*Zegalerus tenuis* (Gray 1867)	L, C.
*	*Tanea zelandica* (Quoy & Gaimard 1832)	C.
	Eunaticina cincta (Hutton 1885)	L.
*	*Trichosirius inornatus* (Hutton 1873)	C.
*	*Charonia capax euclioides* Finlay 1926	
*	*Monoplex parthenopeum* (Von Salis 1793)	
*	*Austrosassia parkinsonianum* (Perry 1811)	
*	*Xenophalium* cf. *pyrum* (Lamarck 1822)	L, C.
*	*Heliacus maorianus* n. sp.	
	Syrnola lawsi n. sp.	
	Syrnola tepikiensis n. sp.	
	Chemnitzia n. sp. aff. *aoteana* Powell 1930‡	C.
*	*Chemnitzia* n. sp. (occurs Recent from 50 fath. off Oamaru)	
	Chemnitzia	
	Pyrgulina n. sp.	
	Odostomia n. sp.	
	Odostomia n. sp.	
*	*Odostomia* n. sp. (occurs Recent in the vicinity of Auckland)	
	Odostomia sherriffi Hutton 1883	C.
*	*Odostomia chordata* Suter 1908	
	Glaphyrina vulpicolor annectens n. subsp.	
	Buccinulum (Evarnula) striatum (Hutton 1875)	C.
	Buccinulum (Evarnula) gracillimum n. sp.	
*	*Buccinulum (Euthrena)* cf. *heteromorphum* Powell 1929	
*	*Austrosipho (Verconella) dilatata* (Quoy & Gaimard 1833)	C.
	Austrosipho (Verconella) edita n. sp.	
*	*Aeneator attenuata* Powell 1927	C.
*	*Austrofusus glans* (Bolten 1798)	C.
*	*Cominella (Cominista) glandiformis* (Reeve 1847)	C.
*	*Cominella (Acominia) adspersa* (Bruguiere 1789)	C.
	Cominella (Cominula) kempi n. sp.	
*	*Nassarius aoteanus* Finlay 1926	
*	*Poirieria zelandica* (Quoy & Gaimard 1833)	C.
	Murexsul tepikiensis n. sp.	
	Zeatrophon bonneti (Cossmann 1903)	C.
*	*Xymenella pusilla* (Suter 1907)	
*	*Lepsiella scobina* (Quoy & Gaimard 1833)	
	Agnewia kempae n. sp.	
	Zemitrella contigua n. sp.	
*	*Alcithoe arabica* (Martyn 1784)	L.
*	*Alcithoe gracilis* (Swainson 1821)	C.
*	*Baryspira mucronata* (Sowerby 1830)	C.
*	*Baryspira (Alocospira) novaezelandiae* (Sowerby 1859)	C.
	Inquisitor wanganuiensis (Hutton 1873)	C.
*	*Melatoma buchanani* (Hutton 1873)	C.
*	*Guraleus sinclairi* (Smith 1884)	C.
	Acteon ambiguus (Hutton 1885)	L, C.
*	*Acteon cratericulatus* Hedley 1906	
*	*Pupa alba* (Hutton 1873)	L.

§Subspecies *inflata* (Hutton 1883) also occurred, but this is possibly only a growth form peculiar to specimens adherent upon the shells of *Maoricolpus rosea*.

‡For the Pyramidellid identifications, the writer is indebted to Mr. C. R. Laws, of Auckland, who has written a monograph of the N.Z. species in which will appear the new genera and species here indicated.

CLASS AMPHINEURA.

* *Ischnochiton maorianus* (Iredale 1914) .. ..
* *Terenochiton inquinatus* (Reeve 1847) .. .. C.
* *Notoplax mariae* (Webster 1908) .. .. C.

PHYLUM BRACHIOPODA.

* *Terebratella inconspicua* (Sowerby 1846) .. ..
* *Terebratella sanguinea* (Leach 1814) .. ..

Species still living are prefixed by an asterisk, and those known to occur at Landguard Bluff or Castlecliff are followed by an "L" or a "C" respectively.

SUMMARY.

Total number of species	112
Number of extinct species	26
Percentage of Recent species	76.78

FISSURELLIDÆ.

Genus TUGALI Gray 1843.

Tugali superba n. sp. Pl. 58, figs. 10 and 11.

Shell moderately large, depressed, oblong, not noticeably narrowed in front. Sculptured with a fairly open, crisp reticulation of radial and concentric ribs. Sinus rib distinctly tricarinate, which places the species in the *elegans–pliocenica–opuraensis–navicula* series, although with its rectangular outline the shell simulates the shape of the *bascauda,* bicarinate-ribbed series. Apex at the posterior fifth, low. Sides parallel, broadly rounded at both ends, but very slightly narrowed anteriorly. Radial sculpture at the margin consists of about 88 regularly alternating crisp rounded radials, of which 51 are primaries. The radials are crossed by slightly finer crisp, concentric ridges, which enclose rectangular interspaces that are considerably longer than wide. Interior smooth and polished, margins crenulated, corresponding to the external ribbing.

Length, 23 mm.; width, 12.25 mm.; height, 5.25 mm. (Holotype).

Differs from previously described species in its very depressed shape, extremely slight anterior narrowing, and crisp ribbing, with more open interstices.

TRIPHORIDÆ.

Genus NOTOSINISTER Finlay 1926.

Type (original designation): TRIPHORA FASCELINA Suter.

Notosinister tepikiensis n. sp. Pl. 57, fig. 4.

Shell small, subulate. Whorls 14, including a typical polygyrate protoconch of five whorls, having a sharp median carina crossed by closely spaced fine axial threads. Post-nuclear whorls tricarinate, crossed by regular, closely spaced axials; points of intersection raised into rounded gemmules. On the first four post-nuclear whorls the central carina is weakest, but the three are

equally developed over the later whorls. The suture is margined above by a very fine spiral thread, and the body-whorl has the addition of two basal spiral keels. There are 21 axial ribs upon the penultimate whorl. Spire tall, a little more than five times the height of the aperture, outline slightly convex. Aperture subquadrate, produced below into a short, open canal which is sharply bent to the right. Outer-lip thin and sharp, sinuated, with a distinct sutural notch. Columella short, vertical.

Height, 5.8 mm.; diameter, 1.7 mm. (Holotype).

Height, 6.35 mm.; diameter, 1.6 mm. (*infelix*, 30 fathoms, Hen and Chicken Islands).

This species appears to be directly ancestral to the Recent *infelix*, from which it differs in being less slender, with a more convex spire outline, evenly tricarinate over all but the early whorls; and in having a more open canal, and in consequence a less sinuous basal lip.

PYRAMIDELLIDÆ.

Genus SYRNOLA A. Adams, 1860.

Type (by monotypy): SYRNOLA GRACILLIMA Adams.

Syrnola lawsi n. sp. Pl. 57, figs. 1 and 2.

Shell very large for the genus, subulate, smooth and polished. Whorls numerous, 11½ showing in the more complete specimen, but probably at least one whorl and the protoconch are missing. Height of each whorl of the spire about half the diameter. Spire very tall, straight sided and about five and one-third times height of aperture. Suture slightly indented, not margined. Surface highly polished, but with dense spiral striae barely visible even under a high magnification. Body-whorl higher than broad, and rounded at periphery. Aperture subrhomboid. Columella oblique, straight, with a weak fold situated very high up, slightly expanded, and free from the base, resulting in a small umbilical chink. Outer-lip sharp, rather straight above and narrowly rounded basally.

Height (actual), 13.5 mm.; (estimated) 14.5 mm.; diameter, 3.4 mm. (Holotype).

Height (actual), 15.25 mm.; (estimated) 18.5 mm.; diameter, 3.9 mm. (Paratype).

This fine species is characterised by its extremely large size, and straight-sided, many-whorled spire. The nuclear whorls are unknown, but Mr. Laws, who has prepared a monograph of this family, has little hesitation in classing it in *Syrnola*.

Syrnola tepikiensis n. sp. Pl. 57, fig. 3.

Shell very large for the genus, subulate, smooth and polished except for a few faint subperipheral spiral striations. Whorls numerous, ten and one-third showing in the holotype, which has

the protoconch and several post-nuclear whorls missing. Height of each whorl of the spire about one fourth the diameter. Spire very tall, straight sided, except for deeply impressed V-shaped bevel-sided sutures. The body-whorl is rounded except for the very slight sutural bevel. The aperture is slightly damaged, but is shown to be small, with six sharp spiral ridges upon the inside of the outer lip. Columella vertical, very massive, with a strong plait at the upper two thirds of its height.

Height (actual), 13.6 mm.; (estimated), 15.5 mm.; diameter, 4.5 mm. (Holotype).

Marshall and Murdoch's *S. semiconcava* 1923, Trans. N.Z. Inst., vol. 54, p. 122, from Awamoa is related. It has a similar bevelled suture, massive columella and plait, and evidently crenulations inside the outer lip. This latter feature is not mentioned but the rather sketchy figure seems to indicate it. From *semiconcava* the Cape Runaway species differs in the proportions of the whorls, which are much lower and broader.

The remaining Pyramidellids, indicated near the beginning of this paper, in the list of Cape Runaway species, will be dealt with later in Mr. Laws' monograph.

Architectonicidæ.

Genus Heliacus d'Orbigny 1842.

Type: Solarium heberti Deshayes.

The genus *Heliacus* has hitherto had a precarious standing in New Zealand literature. Several Tertiary species have been described under the genus name, but Finlay (1926, Trans. N.Z. Inst., vol. 57, p. 401) has shown that all belong to other genera. This pronouncement left only one undoubted record of *Heliacus* in New Zealand; Suter's "*H. variegatus* (Gmel.)," from 37 fathoms off Cuvier Island (1913, Man. N.Z. Moll., p. 317). Suter's description of this shell is obviously composite, for neither the dimensions nor the colour pattern given are in accord with the Cuvier shell. Finlay (1926, Trans. N.Z. Inst., vol. 57, p. 401) suggested that Suter's description and figure were more in accord with *H. stamineus* (Gmelin), but an examination of the actual Cuvier specimen from the Suter collection now in the Wanganui Museum, shows that this shell cannot be referred to either of the above mentioned species.

Most of the earlier figures and descriptions of the species of *Heliacus* are very sketchy, and it is difficult to be definite about details of sculpture. However, the New Zealand species, with its eleven-ribbed spiral sculpture, appears to be distinct from any hitherto described.

A specimen identical with the Cuvier Island shell, but larger and from the Cape Runaway bed, is selected for the holotype of the species, and a description follows.

Heliacus maorianus n. sp. Pl. 58, figs. 5, 6 and 7.

Shell small, depressed, lenticular, radiately and spirally sculptured, solid. Whorls $4\frac{1}{4}$, plus a typical inverted *"Agadina"* protoconch, with the apex (really the base of the protoconch) slightly obliquely sunken and inrolled. Spire much depressed, broadly conical, half the height of aperture. Spiral sculpture of eleven strong flat-topped ribs, having almost linear, channelled interspaces. A pair of peripheral spirals and that bordering the umbilicus are stronger than the rest. The whole is crossed by numerous radials, similar in size and spacing to the spirals. The deeply channelled interspaces to the radials cross the spirals and cut them into series of small rectangular granules. The spire whorls have five spiral ribs, the fifth one, which is the upper peripheral spiral, being about twice the size of the others. Umbilicus wide, deep, perspective, slightly less than one-fourth major diameter of the base. Aperture subcircular. Outer-lip indented by the external sculpture. Columella vertical, expanded, with a broad spiral rib situated below the middle, which is deeply grooved immediately above and below.

Diameter, 11.75 mm.; height, 6.5 mm. (Holotype).

Diameter, 8.75 mm.; height, 5.0 mm. (off Cuvier Island in 37 fathoms).

CAPULIDÆ.

Genus CAPULUS Montfort 1810.

Type: PATELLA UNGARICA Linn.

Capulus uncinatus (Hutton 1873). Pl. 59, figs. 16 and 17.

1873. *Pilaeopsis uncinatus* Hutton, Cat. Tert. Moll., p. 14.

1886. *Pilaeopsis uncinatus* Hutton. Hector, Outline Geol. N.Z., p. 48, figs. 2, 5.

1893. *Hipponyx uncinatus* Hutton, Macleay Mem. Vol., Plioc. Moll., p. 62.

1914. *Capulus australis* (Lamk.) Suter, not of Lamk. 1819, N.Z. Geol. Surv. Pal. Bull. No. 2, p. 19.

Hutton in describing his species gave the bare locality reference "Wanganui U," the "U" signifying upper part of the Wanganui System. So far as the writer is aware the specimen here figured is the only one known to have been collected since the finding of the type. The writer's specimen was collected by Mr. W. La Roche at Landguard Bluff, the uppermost beds of the Wanganui System, and it would seem that the species is restricted to this horizon, for, although the other Castlecliffian localities have been subjected to intensive collecting, no further specimens of *uncinatus* have been found.

One perfect specimen of *uncinatus* and several broken ones were found in the Cape Runaway bed.

Length, 33 mm.; breadth, 29 mm.; height, 20 mm. (Holotype? Suter, 1914, l.c. p. 19).

Length, 27.75 mm.; breadth, 23.5 mm.; height, 14 mm. (Landguard Bluff specimen.) Pl. 59, figs. 16 and 17.

Length, 30.25 mm.; breadth, 28 mm.; height, 14.5 mm. (Cape Runaway specimen.)

An apparently constant feature of the species is the presence of a deep broad sinus and various irregularities in the basal margin of the aperture. The Recent *C. calcareus* Suter is known to favour for an anchorage the base and canal of *Austrosipho dilatata,* and it is here suggested that the fossil species had a similar habit. In fact, specimens placed upon the constricted region of the base of *Austrosipho* near the neck of the canal fit very well, the deep broad sinus matching the curve of the neck. Further, minor corrugations of the margin of the *capulus* indicate the sculpture of the host to be rather coarse, such as obtains in the common Cape Runaway *Austrosipho* herein described as *edita.*

NATICIDÆ.

Genus EUNATICINA Fischer 1885.

Type: NATICA PAPILLA Gmelin.

Eunaticina cincta (Hutton 1885). Pl. 59, fig. 18.

1885. *Sigaretus (Naticina) cinctus* Hutton, Trans. N.Z. Inst., vol. 17, p. 318, pl. 18, f. 12.

1893. *Sigaretus cinctus* Hutton, Macleay Mem. vol., p. 55.

1915. *Polinices (Euspira) cinctus* (Hutton), Suter, N.Z. Geol. Surv. Pal. Bull. No. 3, p. 9, pl. 4, f. 5.

1918. *Sinum cinctum* (Hutton), Suter Alph. List N.Z. Tert. Moll., p. 25.

1924. *Sinum (Eunaticina) cinctum* (Hutton), Marwick, Trans. N.Z. Inst., vol. 55, p. 572.

Like the previous species, this one also was described with the bare locality reference, "Wanganui." No subsequent collecting brought to light any further specimens, until Mr. W. La Roche found at Landguard Bluff a single specimen of this species, together with his *Capulus uncinatus.* A well preserved specimen of *cinctum* occurred in the Cape Runaway bed.

Height, 16 mm.; diameter, 12.5 mm. (Holotype. Suter 1915 l.c. p. 9.)

Height, 11.75 mm.; diameter, 10 mm. (Landguard Bluff specimen.) Pl. 59, fig. 18.

FASCIOLARIIDÆ.

Genus GLAPHYRINA Finlay 1926.

Type (original designation): FUSUS VULPICOLOR Sowerby.

Glaphyrina vulpicolor annectens n. subsp. Pl. 60, figs. 28 and 29.

This subspecies is intermediate in character between the Castlecliff *G. vulpicolor progenitor* Finlay 1926, and the typical Recent species. It has the more even and less prominent spirals of *progenitor*, but also a more extensive distribution of the axials, which cover all but the last whorl. Also these axials number eleven per whorl in *annectens* instead of the usual twelve or thirteen of Recent shells.

Recent shells from a variety of localities and from depths down to 25 fathoms, show no marked variation in sculpture, so it would seem that the Te Piki fossils represent a definite stage in the evolution of *vulpicolor* rather than a benthic variant approximately contemporary with the Castlecliff *progenitor*.

Height, 33 mm.; diameter, 14.5 mm. (Paratype).

Height, 31 mm.; diameter, 13 mm. (Holotype).

BUCCINULIDÆ.

Genus BUCCINULUM Swainson 1837.

Subgenus EVARNULA Finlay 1926.

Type (original designation): COMINELLA STRIATA Hutton.

Buccinulum (Evarnula) gracillimum n. sp. Pl. 58, figs. 8 and 9.

Shell moderately large, solid, fusiform; sculptured with regularly spaced thin, raised spiral cords, subsidiary crowded spiral striations, and axials upon the upper spire whorls only. Whorls $7\frac{1}{2}$, including typical bluntly dome-shaped protoconch of $2\frac{1}{2}$ whorls (two whorls smooth, last half whorl of close axial ribs). Spire tall, almost equal to height of aperture plus canal; outlines evenly convex except for a slight subsutural concavity. The post-nuclear sculpture consists of fairly strong rounded axials which occur only upon the first $2\frac{1}{2}$ whorls, becoming obsolete upon the antepenultimate, and entirely absent from the last two whorls. The spiral cords are narrow, rounded, and sharply raised, and number four upon the upper spire whorls, but increasing to five upon the penultimate, while there are thirteen upon the body-whorl and base. Between each of these primary cords there is a single weak secondary cord, which divides the still finer microscopic spiral lirations, of which there are five upon each side of each secondary cord, making ten, plus the secondary cord, between each pair of primary cords. The spiral lirations are delicately reticulated by dense microscopic axial growth striae. Aperture pyriform, produced below into a moderately long, narrow, open canal. Outer-lip thin, very slightly thickened and lirate within. Inner-lip callus with about nine irregularly

shaped denticles and the usual parietal tubercle. The colour pattern, which is wonderfully well preserved, is of narrow reddish-brown lines upon a white or buff coloured ground. The colour-lines coincide exactly with the primary cords.

Height, 35 mm.; diameter, 15 mm. (Holotype).

This species is closely allied to Hutton's *striatum* from the Upper Pliocene of Wanganui, but differs in being more narrowly fusiform and more distinctively sculptured, the primary cords being fewer and more sharply raised. Also the primary cords in *gracillimum* are coloured, whereas *striatum* is presumed to have been without colour-bands. This supposition is based upon the occurrence of banded *gracillimum* and plain *striatum*, both in the Te Piki bed. In this bed colour markings have been preserved in practically every instance.

Genus Austrosipho Cossmann 1906.

Subgenus Verconella Iredale 1914.

Type (original designation): Fusus dilatatus Quoy and Gaimard.

Austrosipho (Verconella) edita n. sp. Pl. 60, figs. 24 and 25.

Shell close to the Recent *adusta*, but much more slender, with a proportionately higher spire, and more deeply incised sculpture. Whorls 10, including typical *"adusta"* type of protoconch of 3 whorls. Spire tall, about five-sixths height of aperture, plus canal. In *adusta* the spire height varies between three-fourths and two-thirds that of the aperture, plus canal. Shoulder only slightly concave, sharply descending, forming an angle of 35° with the vertical axis of the shell. In *adusta* this angle is mostly about 50°, although occasional deep-water specimens are near to 35°. Compared with the fossil species these slender deep-water Recent *adusta* specimens are always finer in sculpture and have the canal instead of the spire disproportionately long. The spiral sculpture consists of ten primary rounded scabrous cords and one to three interstital spiral threads. On the early spire whorls there is only one interstital thread, but as the whorls increase a still smaller thread appears in each interspace between a primary cord and a secondary thread. Closely spaced axial growth lines cut the surface of the spirals into blunt scales. The axials are weak upon the early whorls, but increase rapidly in size over the penultimate and body-whorls, where they number ten per whorl. These axials are nodulous where they cross the peripheral carina, which is a blunt ridge made up of two primary spirals and the intermediate threads. Aperture small. Canal long and slightly twisted. Peripheral keel below the middle.

Height, 134 mm.; diameter, 58 mm.; height of spire, 62 mm. (Holotype).

Height, 116 mm.; diameter, 50 mm.; height of spire, 54 mm. (Paratype).

Height, 135 mm.; diameter, 68 mm.; height of spire, 55 mm. (*adusta* from 25 fathoms).

COMINELLIDÆ.

Genus COMINELLA Gray 1850.

Subgenus COMINULA Finlay 1926.

Type (original designation): COMINELLA QUOYANA A. Adams.

Cominella (Cominula) kempi n. sp. Pl. 58, figs. 12 and 13.

Shell small, fusiform, solid, sculptured with prominent axial costae and fine spiral striations. Whorls 8, including a moderately large dome-shaped protoconch of $2\frac{1}{2}$ whorls, followed by a brephic stage of a half whorl of closely spaced, vertical, axial costae. Post-nuclear whorls sculptured with strong, regularly spaced, slightly obliquely-flexuous, axial costae, which number ten on the early whorls and twelve on the penultimate. Spire tall, one and one-third times height of aperture; outline turreted by a deeply concave shoulder. The axials diminish as they cross the shoulder and become obsolete over the lower half of the body-whorl. Spiral sculpture of very fine, numerous, flattened threads, with linear interspaces, and more distant and more deeply incised lines, five upon spire-whorls and about nine upon the body-whorl and base. Aperture vertical, narrowly-ovate, with a short, widely open and deeply notched anterior canal. Columella vertical arcuate, smooth, with a *"Phos"*-like plait at its base. Fasciole prominent, keeled. When wet, specimens show the original colour pattern, which is identical with that of the Recent genotype, being marbled with reddish brown, spiral grooves dark brown, and aperture and columella white.

Height, 21.5 mm.; diameter, 9.4 mm. (Holotype).

Height, 21 mm.; diameter, 10.2 mm. *(quoyana)*.

Height, 21.5 mm.; diameter, 10.8 mm. *(quoyana)*.

Compared with *quoyana*, the Cape Runaway species is narrower, having a taller spire and more oblique and fewer axials. In these respects it is shown to be a species intermediate between the Nukumaruan (Mid-Pliocene) *hamiltoni* Hutton, and the Recent *quoyana*.

MURICIDÆ.

Genus MUREXSUL Iredale 1915.

Type (original designation): MUREX OCTOGONUS (Quoy and Gaimard 1833).

Murexsul tepikiensis n. sp. Pl. 59, figs. 14 and 15.

Shell rather small and squat, with a tumid body-whorl, which is sub-angular above the middle. Apex eroded; post-nuclear whorls five. Spire moderate, about two-thirds height of aperture, plus canal. Aperture invert-pyriform, full above, but rapidly contracted to a rather short, narrowly open, recurved canal. Fasciole keeled by a sharp scaly ridge which bounds an open umbilical chink. Spiral sculpture of evenly developed, prominent, raised ridges, which are crowded with sharp imbricating scales. These spirals number ten upon the penultimate whorl and twenty

upon the body-whorl. The axials are broadly rounded, not prominent, and become obsolete over the entire body-whorl.

Height, 26 mm.; diameter, 14.5 mm. (Holotype).

Height, 25 mm.; diameter, 13 mm. (Topotype of *mariae).*

Height, 17 mm.; diameter, 9 mm. (Holotype of *mariae).*

Height, 34.5 mm.; diameter, 16 mm. (Topotype of *espinosus* Hutton).

The Nukumaruan *M. espinosus* Hutton, of which the writer collected topotypes from Petane, Hawke's Bay, is far nearer to the Recent *octogonus* than it is to the Cape Runaway species, which is apparently directly ancestral to the Recent Cape Maria van Diemen, *M. mariae* Finlay 1930 (Trans. N.Z. Inst., vol. 61, p. 237). From *mariae,* the new species differs in being still more tumid, in having subobsolete axials, and the spirals regular and closely imbricated.

THAISIDÆ.

Genus AGNEWIA Tenison-Woods 1878.

Type (original designation): PURPURA TRITONIFORMIS Blainville = ADAMSIA Dunker 1856 (same type): not ADAMSIA Forbes 1840.

Agnewia kempae n. sp. Pl. 59, figs. 19 and 20.

Shell small, fusiform rather thin. Whorls 8, including a typical four-whorled *"sinusigera"** protoconch. Sculpture consisting of broad, low, obscure axial folds crossed by fine, crisp, sharply-raised spiral cords. These cords number five on the first post-nuclear whorl, eight upon the third post-nuclear, twelve upon the penultimate, and about forty upon the body-whorl and base. The interspaces are mostly from one and a-half times to twice the width of the cords. The axials number thirteen per whorl and are most distinct upon the earlier whorls. Spire elevated, conic, about same height as aperture; outline sinuous, generally arcuate, but slightly concave just below suture. Aperture subvertical, narrowly ovate, with a very short, straight and open shallowly notched anterior canal. Parietal and columella callus polished, slightly countersunk. Fasciole defined by a strong rounded ridge and sculptured with fine, closely spaced spiral threads. Outer lip thin and sharp.

Height, 18 mm.; diameter, 8.5 mm. (Holotype).

Compared with the Recent genotype, the fossil species has less prominent axials and more widely spaced and sharply raised spirals. It adds a genus to the New Zealand Tertiary fauna.

The species is named after Mrs. A. E. Kemp, of Cape Runaway.

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*Iredale (1911, Proc. Malac. Soc., vol. 9, pp. 319-323), in a paper "on the Value of the Gastropod Apex in Classification," has described the *Sinusigera* protoconch and given an interesting account of its significance. This type of apex is always associated with species of wide distribution, its presence indicating a lengthy, free-swimming larval stage.

Genus ZEMITRELLA Finlay 1926.

Type (original designation): LACHESIS SULCATA Hutton.

Zemitrella contigua n. sp. Pl. 59, figs. 21 and 22.

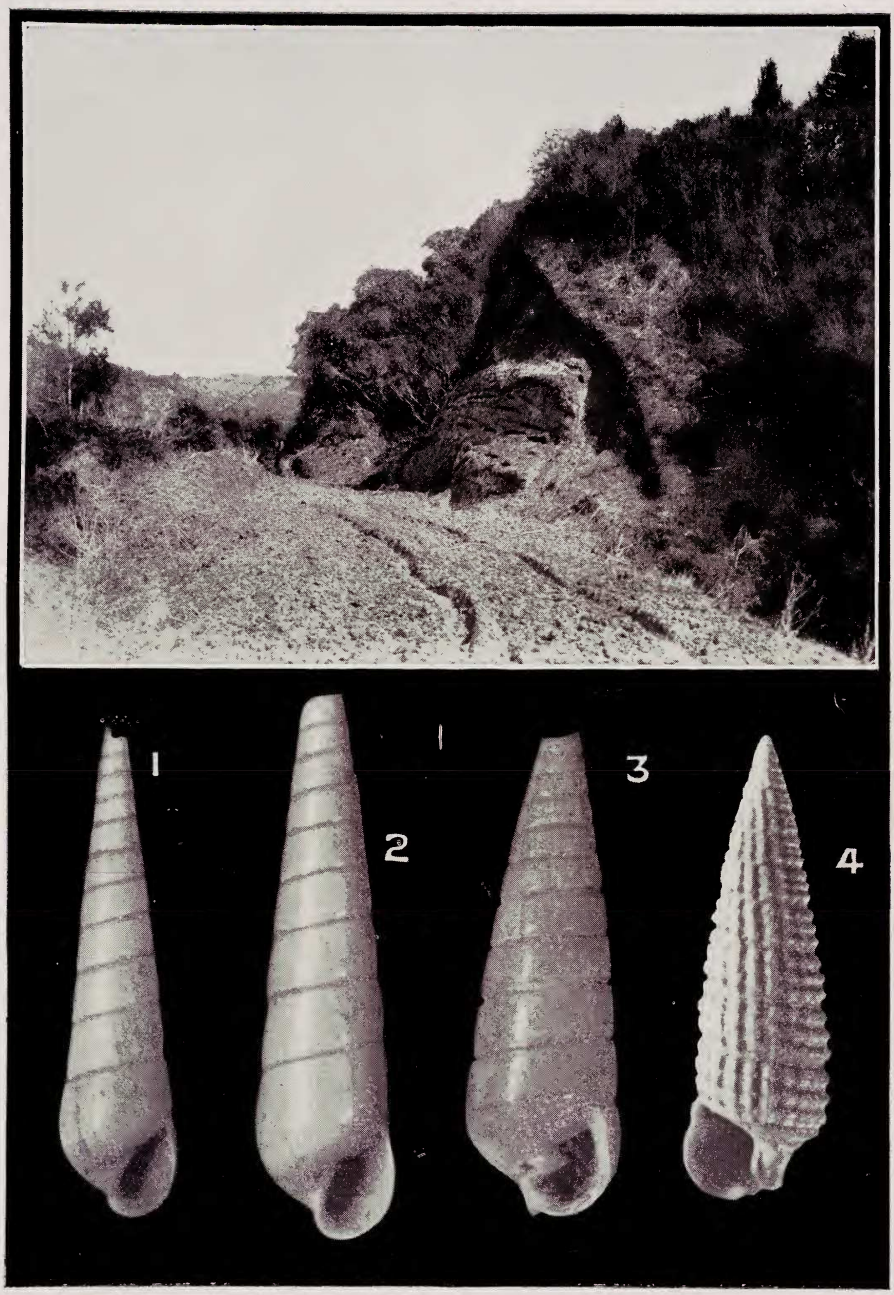
Shell moderately large for the genus, smooth and polished except for about eight evenly spaced weak spirals upon the neck of the base, and another eight much more closely spaced and less prominent upon the fasciole. Spire about equal to height of aperture, outlines only slightly convex. Whorls 5½, plus smooth papillate protoconch of 1½ whorls. Suture linear, false margined below, by the base of the upper-whorl showing through. Body-whorl evenly rounded, but not bulging. Aperture long and narrow, sides parallel medially. Outer-lip vertical above, rounded and contracted basally; without a distinct canal, but there is a shallow anterior sinus. Within the outer-lip there are about ten weak denticles. Columella straight and vertical medially, and with a distinct oblique plait at the base.

Height, 7 mm.; diameter, 2.95 mm. (Holotype).

Height, 5.5 mm.; diameter, 2.4 mm. (large specimen of *chaova*).

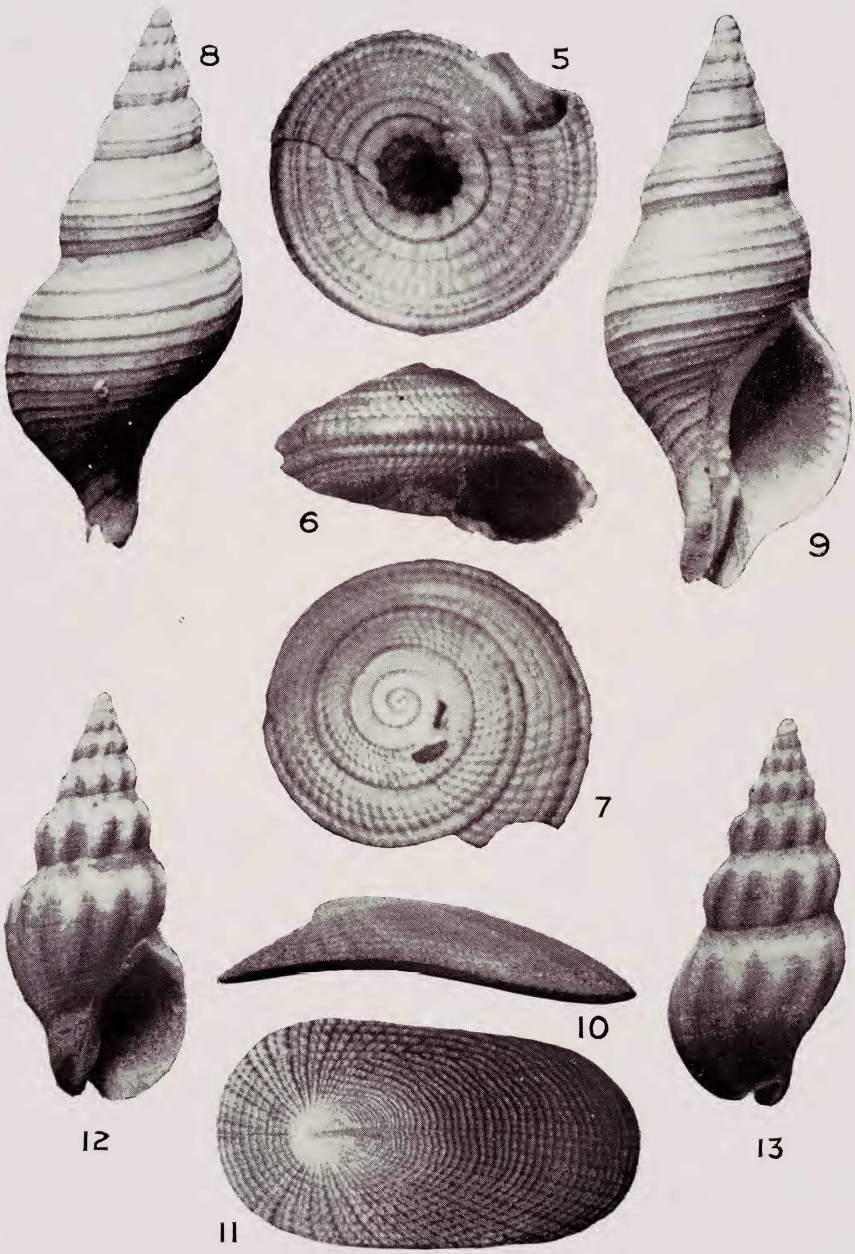
Suter's record for *chaova* (1913, Man. N.Z. Moll., p. 432) of 6.5 mm. x 3 mm. is larger than any the writer has seen.

Compared with *chaova*, the fossil species is slightly larger and less massive, the outer lip is thin and very little thickened within, the aperture is relatively longer and narrower, and the neck of the base more deeply contracted. Otherwise the species is closer to *chaova* than it is to any other of the described species.

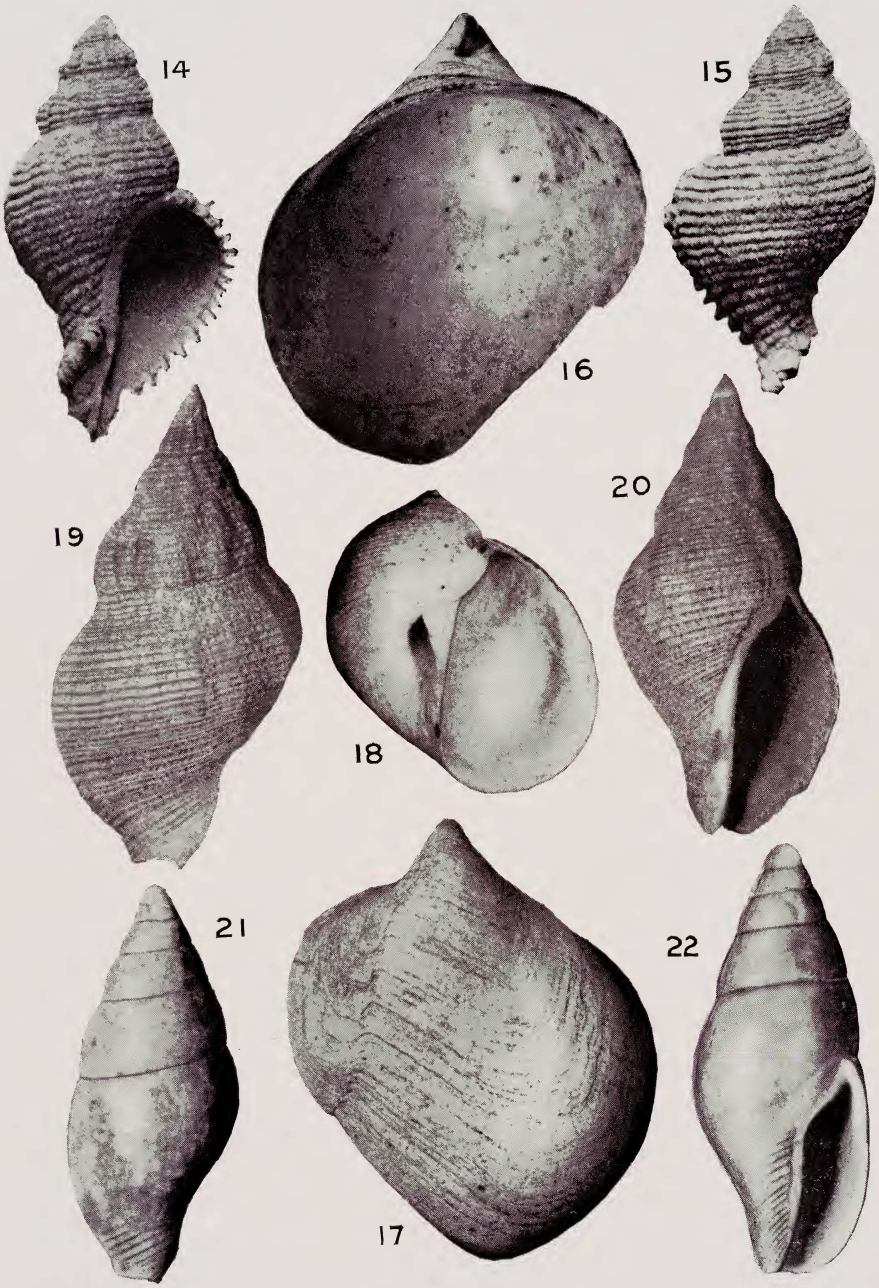


The recently discovered fossiliferous bed of Upper Pliocene (Castlecliffian) age, on the Whangaparaoa-Te Araroa main road, near Cape Runaway.

Fig. 1. *Syrnola lawsi* n. sp. (Holotype).
Fig. 2. *Syrnola lawsi* n. sp. (Paratype).
Fig. 3. *Syrnola tepikiensis* n. sp. (Holotype).
Fig. 4. *Notosinister tepikiensis* n. sp. (Holotype).



Figs. 5-7. *Heliacus maorianus* n. sp. (Holotype).
Figs. 8 & 9. *Buccinulum (Evarnula) gracillimum* n. sp. (Holotype).
Figs. 10 & 11. *Tugali superba* n. sp. (Holotype).
Figs. 12 & 13. *Cominella (Cominula) kempi* n. sp. (Holotype).



Figs. 14 & 15. *Murexsul tepikiensis* n. sp. (Holotype).
Figs. 16 & 17. *Capulus uncinatus* (Hutton 1873). Landguard Bluff (Topotype?)
Fig. 18. *Eunaticina cincta* (Hutton 1885). Landguard Bluff. (Topotype?)
Figs. 19 & 20. *Agnewia kempae* n. sp. (Holotype).
Figs. 21 & 22. *Zemitrella contigua* n. sp. (Holotype).

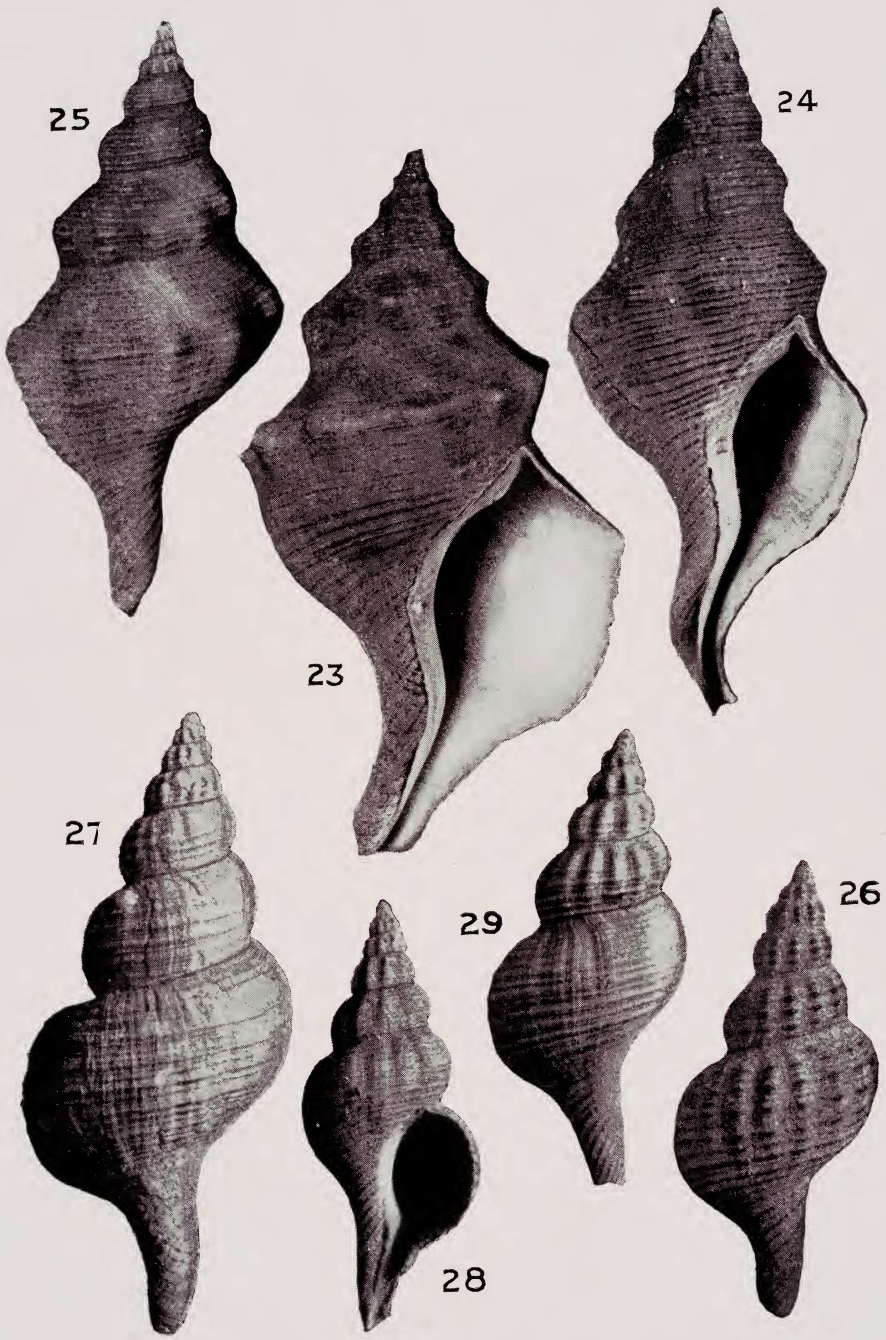


Fig. 23. *Austrosipho (Verconella) adusta* (Phil.) 25 fathoms off Coromandel, Hauraki Gulf.
Fig. 24. *Austrosipho (Verconella) edita* n. sp. (Holotype).
Fig. 25. *Austrosipho (Verconella) edita* n. sp. (Paratype).
Fig. 26. *Glaphyrina vulpicolor* (Sowerby) Recent, Foveaux Strait.
Fig. 27. *Glaphyrina vulpicolor progenitor* Finlay. Castlecliff (Up. Pliocene).
Fig. 28. *Glaphyrina vulpicolor annectens* n. subsp. (Holotype).
Fig. 29. *Glaphyrina vulpicolor annectens* n. subsp. (Paratype).